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ABSTRACT

This experiment was designed to (1) test the effectiveness of proximal goals in promoting performance, developing self-efficacy, and fostering interest in activities, and (2) investigate the relationship between self-efficacy and interest. The focus of the study was children's mastery of arithmetic operations in which they had displayed low achievement. Subjects, drawn from six elementary schools, were 40 children with a mean age of 8.4 years. The treatment consisted of providing children with a packet of instructional materials and having them engage in self-directed learning over a series of sessions under conditions involving a proximal goal, a distal goal, or no explicit goal. It was hypothesized that the motivational effects of the proximal goals would lead to higher arithmetic achievement, self-efficacy, and interest, as compared to the other two conditions, and that self-percepts of efficacy would bear a significant, positive relationship to interest shown in arithmetic tasks. In accordance with the hypotheses the proximal-goal treatment produced more rapid mastery of arithmetic operations, a higher level of skill development, a stronger sense of self-efficacy, and greater interest in arithmetic than did the other conditions. The distal-goal condition did not differ from the no-goal condition in promoting change. Perceived self-efficacy concerning arithmetic competence was positively related to achievement and intrinsic interest in arithmetic. It was concluded that the study supports the idea that self-motivation generated through proximal goal setting can influence children's achievement outcomes. (Author/MP)

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Proximal-Goal Facilitation of Children's Achievement and Interest

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Abstract

Children showing low arithmetic achievement received a program of self-directed learning under conditions involving a proximal goal, a distal goal, or no explicit goal. As compared with the other conditions, the proximal-goal treatment produced more rapid mastery of arithmetic operations, a higher level of skill development, a stronger sense of self-efficacy, and greater interest in arithmetic. The distal-goal condition did not differ from the no-goal condition in promoting change. Perceived self-efficacy concerning arithmetic competence was positively related to achievement and intrinsic interest in arithmetic. The present experiment supports the idea that self-motivation generated through proximal goal setting can influence children's achievement outcomes.

Proximal-Goal Facilitation of Children's Achievement and Interest

According to Bandura (1977, in press-a), self-motivation can be influenced through goal setting. Persons who strive for a certain level of behavior and who perceive a negative discrepancy between this standard and present performance can make self-rewards contingent on improved performance. In the process, they create self-inducements to persist in their efforts until their performance matches the standard.

Besides having motivational effects, goal setting is also hypothesized to influence the development of self-efficacy and task interest. Self-efficacy is concerned with judgments of one's capability to perform given activities. By having a standard against which to compare performance, persons also have a basis for gauging their capabilities. Attainment of a goal adopted as a standard of competence enhances self-efficacy.

Different conceptual explanations support the idea that goal setting can help develop task interest. When persons set goals and master these levels of performance they experience a sense of satisfaction (Locke, Cartledge, & Knerr, 1970). Such satisfactions can build intrinsic interest. Further, in both self-efficacy theory (Bandura, 1977, in press-b) and the theory of intrinsic motivation (Deci, 1975; Lepper & Greene, 1978) perceived competence for an activity plays a mediating role in the development of interest. To the extent, then, that persons develop a sense of competency while pursuing goals they should also develop greater interest in the task.

Self-evaluative reactions do not automatically occur in response to goals. For such reactions to occur, goals must convey clear standards of competence. Certain properties of goals, such as their specificity and level, help to convey such standards (Latham & Yukl, 1975; Locke, 1968; Steers & Porter, 1974). Specific goals convey more information about performance capabilities than do more general intentions, and goals that are difficult but attainable are more informative than goals perceived as either very easy or virtually unattainable.

Another goal property is proximity, which refers to how far into the future the goal projects. Proximal goals, which provide immediate incentives and guides for performance, should exert greater motivational effects than distal goals, which project far into the future and are less effective in influencing what one does in the present. Focus on the future can lead to procrastination and lower productivity. There is evidence attesting to the influence of proximal goals on present behavior (Bandura & Simon, 1977).

The present experiment was designed to test the effectiveness of proximal goals in promoting performance, developing self-efficacy, and fostering interest in activities. A second purpose was to investigate the relationship of self-efficacy and interest. The focus of study was children's mastery of arithmetic operations in which they initially displayed low achievement. The treatment consisted of providing children with a packet of instructional material and having them engage in self-directed learning over a series of sessions under conditions involving a proximal goal, a distal goal, or instructions to work productively without reference to a goal.

Besides boosting performance through their motivational effects,

proximal goals can also help to develop self-efficacy. Self-efficacy develops when persons have clear standards against which they can compare their progress. Proximal goals provide such standards at repeated intervals along the route to more global goal attainment. Conversely, when persons must compare present behavior to a distal goal they are forced to rely on judgments of whether they are making acceptable progress.

Research on intrinsic interest has been largely devoted to exploring the effects of extrinsic rewards on interest when it is initially high. The general findings are that performance-contingent rewards tend to reduce task interest, but that when rewards signal task competence they sustain interest (Boggiano & Ruble, 1979; Lepper & Greene, 1978; Ross, 1976). However, there is little research investigating the conditions that help promote interest in an activity when it is initially low. To the extent that proximal goals help promote self-satisfaction and perceptions of competence in a task, they should also lead to greater task interest than distal goals.

It was hypothesized that the motivational effects of proximal goals would lead to higher arithmetic achievement, self-efficacy, and interest, as compared to the distal- and no-goal conditions. The latter two conditions were not expected to differ from one another. It was further hypothesized that self-percepts of efficacy would bear a significant, positive relationship to interest shown in arithmetic tasks.

Method

Subjects were 40 children ($\underline{M}$ = 8.4 years) drawn from six elementary schools. The 21 males and 19 females were predominantly

middle class. Teachers initially identified children who displayed low arithmetic achievement, persistence, and self-confidence. Those children were administered the pretest individually by an adult tester. The pretest measured subtraction skill, persistence, and self-efficacy.

The skill test contained 25 problems that ranged from two to six columns. These problems tapped the subtraction operations included in the treatment. The tester presented the pretest problems to children one at a time with instructions to examine each problem and to place the problem on a completed stack when they were through solving it or had chosen not to work it any longer. The tester recorded the time children spent with each problem.

Self-efficacy was measured after the skill test. The efficacy scale ranged from 10 to 100 in intervals of 10 with the following verbal descriptors: 10--not sure, 40--maybe, 70--pretty sure, 100--real sure. Children first performed a practice task to familiarize them with the scale format. Following this practice, the tester briefly showed children 25 pairs of problems that corresponded in form and difficulty to those on the preceding skill test. For each pair children privately judged their capability to solve the type of problem depicted.

Following the pretest children were randomly assigned to one of three treatment groups (proximal goal, distal goal, no goal) or to a nontreated control group (N = 10 per group). On separate days, children received seven, 30-minute treatment sessions. Seven sets of instructional material constituted the training packet. This packet incorporated several subtraction operations: subtracting a number from a larger one; subtracting zero; subtracting a number from itself ;

borrowing once and twice; borrowing caused by a zero; and borrowing from zeros.

The format of each set was identical. The first page contained an explanation of the relevant operations along with two step-by-step, worked examples. Each of the next six pages contained several problems for children to solve. Children worked on the packets individually, and were seated out-of-sight of an adult proctor. Children were told to work one page at a time, and that when they came to an explanatory page they were to bring it to the proctor who would read it to them. They would then return to their desks and solve the problems on the succeeding six pages. If children asked for further assistance the proctor reread the relevant section of the explanatory page. At the end of each session children marked their place and resumed work there the following day.

The instructions, format, and materials were identical across treatments; only the goal setting varied. To children in the proximal-goal condition the proctor suggested at the start of the first session that they consider setting themselves a goal of completing at least six pages of problems each session. Pilot testing showed that when children worked at a steady pace they could complete six pages in 25 minutes or less. To children in the distal-goal condition the proctor suggested that they consider setting themselves the goal of completing the entire instructional packet by the end of the seventh session. Both of these goals were given suggestively rather than prescriptively to leave the goal-setting decision to the children. To children in the no-goal condition the proctor suggested that they might try to complete as many pages as possible as they went along. This group

was included to control for the effects of instruction and for the social suggestion to work productively. A control group received the pre- and postassessments but no intervening treatment. This group was included to control for testing effects and for concomitant classroom instruction.

The posttest was administered the day following the fourth training session. This intermediate point was selected to insure that treatment time was identical across subjects. Had children been tested after completing the entire program the posttreatment changes would have been confounded by variations in the amount of time needed to complete the instruction. The posttest was identical to the pretest except that a parallel form of the skill test was used and self-efficacy was measured before and after the skill test. The self-efficacy scores collected before the skill test were used in the data analyses except for those involving the interest measure.

The test of intrinsic interest was given on the day following the posttest. Children were individually given two stacks of 10 pages each. One stack contained 60 subtraction problems of varying levels of difficulty, while the other stack contained rows of digit-symbol problems adapted from the Wechsler Intelligence Scale for Children (Wechsler, 1974). The tester explained that children could work on either or both activities, and that they should indicate how long to spend on each activity. The tester then moved out of children's sight; children worked on this test for 25 minutes.

Results

Subtraction problems were scored as correct if children correctly applied the proper operations. Self-efficacy judgments were summed and

divided by the total number of judgments to arrive at a mean score. Persistence was defined as the number of seconds children spent with each problem.. The number of subtraction problems children worked on during the interest test constituted the interest measure.

No significant sex differences were found on any of the pre- or posttest measures. The data were therefore pooled across sex for the analyses. There were also no reliable differences between experimental conditions on any pretest measure. Analyses of variance procedures were applied using experimental phases and conditions as factors. Significant results were analyzed further using the Newman-Keuls multiple-comparison method. Table 1 shows the pre- and posttest means by condition and the significance of intragroup changes as determined by the t test for correlated means. The posttest self-efficacy scores shown are those collected before the skill test; those collected after the skill test yielded a similar pattern.

Insert Table 1 about here

Both proximal and distal groups experienced significant gains in self-efficacy from pre- to posttest, while the changes for the no-goal and control conditions were nonsignificant. Intergroup comparisons yielded a significant treatment effect, $F(3, 36) = 10.13$, $p < .001$, and a significant treatment x phases interaction, $F(6, 72) = 5.96$, $p < .001$. In separate comparisons between treatments, the proximal group exceeded all others ($p < .05$). As predicted, the distal- and no-goal groups did not differ from one another.

A similar pattern of results was found for arithmetic skill except

that all three treatment groups showed significant gains from pre- to posttest. Intergroup comparisons revealed a reliable treatment effect, $F(3, 36) = 12.80$, $p < .001$, as well as a treatment x phases interaction, $F(3, 36) = 12.55$, $p < .001$. Again, the proximal group exceeded all others ($p < .01$), while the distal- and no-goal groups did not differ.

The persistence data were analyzed separately at two levels of difficulty: A difficult set of problems requiring two or more borrowing operations, and an easier set requiring one or no borrowing operations. This was done because as children become more efficacious they are apt to spend less time solving easier problems. Thus an aggregate persistence measure reflects long times on difficult problems offset by short times on easier ones.

Pre-post comparisons showed that proximal children became significantly more perseverant on difficult problems while controls showed less persistence overall. Intergroup comparisons yielded a reliable treatment x phases interaction, $F(3, 36) = 5.67$, $p < .005$. Although the treatment conditions did not differentiate on this measure, they all showed significantly greater persistence than the controls on difficult problems ($p < .05$).

The interest data yielded a significant treatment effect, $F(3, 36) = 3.57$, $p < .05$. Follow-up comparisons showed that proximal children solved more arithmetic problems ($p < .05$) than children in each of the other three conditions, which did not differ from one another. But this was not at the expense of the competing activity, as children in all groups solved a comparable number of digit-symbol problems.

The proximal-goal treatment also produced more rapid mastery of the subject matter than did the distal, $F(1, 27) = 3.94$, $p < .10$, or no-goal treatment, $F(1, 27) = 5.44$, $p < .05$. The average length of time

to complete each lesson was 21, 29, and 30 minutes for the proximal, distal, and no-goal conditions, respectively. At the end of the fourth session the amount of the instructional packet completed was 74%, 55%, and 53%, for proximal, distal, and no-goal children, respectively. Proximal subjects completed more material than distal children, $F(1, 27) = 3.66$, $P < .10$, and no-goal children, $F(1, 27) = 4.67$, $p < .05$.

Correlational analyses support the idea that skill acquisition builds self-efficacy; the more instructional material children completed, the higher was their sense of efficacy, $r(28) = .42$, $p < .01$. Further, self-efficacy was more highly correlated with posttest subtraction skill, $r(28) = .40$, $p < .025$, than was amount of instructional material completed, $r(28) = .25$, $p < .10$. Although the three treatment groups did not differ in persistence, for the whole sample high persistence was significantly related to posttest skill on difficult problems, $r(38) = .51$, $p < .001$.

There are at least two ways that interest may be related to self-efficacy. Interest may require a minimum level of efficacy, but variations beyond this level may have no effect. To test this threshold hypothesis, interest scores were correlated with posttest efficacy judgments collected after the skill test. Judgments of 40 or above were defined as efficacious; this scale value was accompanied by the descriptor "maybe" and indicated moderate assurance. For the total sample, this relationship was significant, $r(38) = .27$, $p < .05$. On the other hand, interest may be linearly related to self-efficacy: The higher the self-efficacy, the greater the interest. Correlating the interest scores with the mean of the posttest self-efficacy raw scores collected after the skill test yielded significant ($p < .05$) relationships

in the no-goal and control conditions; this relationship was non-significant in the goal-setting conditions. The present data, therefore, provide more support for the threshold hypothesis.

Discussion

The present study attests to the role of proximal goals in promoting achievement, self-efficacy, and task interest. Compared to the other treatments, children in the proximal-goal condition progressed more rapidly through the instructional material, developed greater subtraction skills, viewed themselves as more efficacious, and displayed greater interest in arithmetic.

Investigating the effects of goal proximity presents problems because people often set short-term goals for themselves even when these are not explicitly provided (Bandura & Simon, 1977). This tendency was circumvented in the present experiment; since children did not know how to divide they could not fractionate the instructional packet into daily subunits.

The present results are consistent with prior findings that self-efficacy judgments are not mirror images of past accomplishments. Instead, efficacy judgment reflects an inferential process in which persons draw on past performances while simultaneously weighing personal and situational factors that might influence future performance. This is not to say that past performance is unimportant; children would be unlikely to judge their arithmetic capabilities high if they had consistently failed to solve problems in the past. However, previous research has demonstrated that even when self-efficacy is developed through non-performance means--such as vicarious modeling or systematic desensitization--self-efficacy predicts future performance with a high degree of accuracy

(Bandura & Adams, 1977; Bandura, Adams & Beyer, 1977; Bandura, Adams, Hardy, & Howells, 1980).

Although there was some evidence that posttest arithmetic skill was better predicted from self-efficacy than from performance during treatment, caution must be exercised in drawing causal inferences from correlational data. Part of the "lack of fit" between performance during treatment and posttest performance may be due to the idea that self-efficacy and treatment performance are not discrete but rather continuously interacting variables. It is most unlikely that self-efficacy plays no role during skill acquisition. Judgments of one's capabilities can affect the amount of involvement in the activity. As children become more skilful they solve more problems, and the perception of progress promotes self-efficacy. Future research should address this interactive process more closely.

Past research on intrinsic interest has focused on how extrinsic incentives affect interest when it is already present, rather than on how to develop it when it is lacking. The present study supports the idea that proximal goals can influence interest in activities. When present progress must be compared to a distant goal, or when there is no standard present, personal competencies become more difficult to assess. Thus interest may be lacking even though skills may be present.

In investigating the relationship between self-efficacy and intrinsic interest, the present study found support for the threshold hypothesis; that is, a minimum level of perceived competence is required for interest to be shown in an activity, but variations in self-efficacy beyond this level do not differentially affect interest. This finding, while offering some support to the thesis that perceptions of competence

mediate the relationship between past performance and intrinsic interest, is nonetheless inconclusive.

Other explanations are possible. For example, a minimal threshold of self-perceived competency may be necessary for interest to be shown. Interest may then increase monotonically with increases in self-efficacy up to point, after which interest falls off. Thus children who perceive themselves as highly skillful may decline invitations to solve arithmetic problems since they are certain that they can solve all of them. Problem solving under these circumstances would provide no new information about one's capabilities and might be perceived as boring.

On the other hand, it is possible that there is a temporal lag between the development of self-efficacy and the development of interest, with the former preceding the latter. Thus children who perceive their competencies as high may require time to test out their skills in a variety of situations in order to gain valid performance information to substantiate their perceptions. As perceptions become validated, interest may develop. Future research should address the relationship between self-efficacy and interest as both are developing.

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Table 1

Pre- and Posttest Achievement Outcome Means and Significance Levels by Experimental Phases and Conditions

Measure	Experimental Phase	Experimental Condition			
		Proximal Goal	Distal Goal	No Goal	Control
Skill[a]	Pretest	1.8	2.4	1.6	1.4
	Posttest	20.6***	11.1**	12.7**	2.3
Persistence[b]	Pretest-Easy	22.8	33.1	25.0	27.3
	Posttest-Easy	24.7	31.6	26.2	19.0**
	Pretest-Difficult	22.9	35.7	26.7	30.1
	Posttest-Difficult	43.6**	43.4	38.0	21.4**
Self-Efficacy[c]	Pretest	33.2	34.2	35.0	36.0
	Posttest	75.0**	57.8*	50.9	36.0

[a]Total number of accurate solutions; maximum of 25.

[b]Average number of seconds per problem.

[c]Average judgment per problem.

*$p<.05$

**$p<.01$

***$p<.001$